HEALTH ADVISORY:

DRAFT
SAFE EATING GUIDELINES FOR FISH AND SHELLFISH FROM THE SAN JOAQUIN RIVER AND SOUTH DELTA (CONTRA COSTA, SAN JOAQUIN, STANISLAUS, MERCED, MADERA, AND FRESNO COUNTIES)

March 2007

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EXECUTIVE SUMMARY

Mercury levels were evaluated in edible tissues of fish and shellfish caught from the southern portion of California's Central Valley, the San Joaquin Valley. This draft report and the safe eating guidelines contained therein pertain to fish caught from water bodies in this area, including the San Joaquin River and other water bodies (*e.g.*, sloughs, flooded tracts) located in the San Joaquin Delta to the south of the San Joaquin River. This area is situated in Contra Costa, San Joaquin, Stanislaus, Merced, Madera, and Fresno Counties. Data collected through several different projects were evaluated. The most recent data were collected and analyzed for mercury under the Fish Mercury Project (FMP), a three-year study funded by the California Bay Delta Authority. In 2005, the first year of the project, sampling focused on the San Joaquin River and other water bodies in the San Joaquin Delta south of the San Joaquin River (referred to throughout the report as the "South Delta" to distinguish it from the Sacramento Delta, north of the San Joaquin River) in order to support evaluation of mercury concentrations in fish from this area. Historical data were also assembled for fish from this area; these data were collected and analyzed through projects conducted by the Toxic Substances Monitoring Program, Surface Water Ambient Monitoring Program, the CALFED Mercury Project, and the University of California at Davis. The Central Valley Regional Water Quality Control Board compiled a large dataset comprised of the historical data. The Office of Environmental Health Hazard Assessment (OEHHA) reviewed the dataset and compared it to the original datasets from which it was derived. Data suitable for issuing fish consumption advisories were selected and verified before using them, in addition to the results from the 2005 FMP, for the evaluation and fish consumption guidelines presented in this draft report. Chlorinated hydrocarbon contaminants, including pesticides and polychlorinated biphenyls (PCBs), were also measured in a limited number of samples of fish and shellfish; these data were obtained from the Delta-San Joaquin Study (Davis *et al*., 2000) and TSMP. Dioxins/furans and PCB concentrations in a very limited sample of fish from one area collected by the California Department of Health Services were also considered. The combined contaminant data were evaluated by OEHHA to determine whether there may be potential adverse health effects associated with the consumption of sport fish from these water bodies, and to identify types of fish and/or locations where fish consumption could be recommended due to lower levels of contaminants. Based on this evaluation, draft safe eating guidelines were developed to aid consumers in selecting fish from this area with low concentrations of contaminants, thereby keeping exposure to mercury and/or other chemicals within safe levels and allowing fish consumers to continue to eat fish and enjoy the benefits.

Mercury contamination of fish is a national problem that has resulted in the issuance of fish consumption advisories in most states, including California (U.S. EPA, 2003). Mercury is a trace metal that can be toxic to humans and other organisms. Mercury occurs naturally in the environment, and is also redistributed in the environment as a result of human activities such as mining and the burning of fossil fuels. Once mercury is released into the environment, it cycles through land, air, and water. In aquatic systems, it undergoes chemical transformation to the more toxic organic form, methylmercury, which accumulates in fish and other organisms. Almost all fish contain detectible levels of mercury, more than 95 percent of which occurs as methylmercury, a potentially highly toxic form of the element. Consumption of fish is the major route of exposure to methylmercury in the United States. For more information on mercury, see Appendix I.

The critical target of methylmercury toxicity is the nervous system, particularly in developing organisms such as the fetus and children. Methylmercury toxicity can occur to the fetus during

pregnancy even in the absence of symptoms in the mother. In 1985, the United States Environmental Protection Agency (U.S. EPA) set a reference dose (that is the daily exposure likely to be without significant risks of deleterious effects during a lifetime) for methylmercury of $3x10^{-4}$ milligrams per kilogram of body weight per day (mg/kg-day), based on central nervous system effects (ataxia, or loss of muscular coordination; and paresthesia, a sensation of numbness and tingling) in adults. This reference dose (RfD) was lowered to $1x10^{-4}$ mg/kg-day in 1995 (and confirmed in 2001), based on developmental neurologic abnormalities in infants exposed *in utero*. Because OEHHA finds convincing evidence that the fetus is more sensitive than adults to the neurotoxic effects of mercury, but also recognizes that fish can play an important role in a healthy diet, OEHHA chooses to use both the current and previous U.S. EPA reference doses for two distinct population groups. In this advisory, the current RfD based on effects in infants will be used for women of childbearing age and children aged 17 years and younger. The previous RfD, based on effects in adults, will be used for women beyond their childbearing years and men.

The dataset for the San Joaquin River and South Delta is comprised of fish and/or shellfish tissues that were collected and analyzed for mercury largely from the following species: Asiatic clam, bluegill, redear sunfish, crappie, carp, largemouth bass, channel catfish, white catfish, red swamp crayfish, and signal crayfish. Other fish and shellfish species collected in fewer numbers and/or locations were striped bass, hitch, brown bullhead, black bullhead, Sacramento perch, Sacramento blackfish, Sacramento pikeminnow, and Sacramento sucker. Samples were collected from a total of 102 locations on the San Joaquin River and/or in other water bodies in the South Delta.

In order to provide draft safe eating guidelines for various fish species, contaminant concentrations in fish from a water body are compared to OEHHA guidance tissue levels for those chemicals. Guidance tissue levels are used by OEHHA to determine the appropriate meal consumption advice for consumers to prevent exposure to more than the average daily reference dose for non-carcinogens or to a risk level greater than $1x10^{-4}$ for carcinogens. One or more data evaluation approaches are then used to develop consumption advice. Safe eating guidelines provide information to fish consumers as to which fish or shellfish species have high chemical concentrations and whose consumption should be restricted or avoided altogether, as well as fish or shellfish that are low in contaminants and may be consumed frequently as part of a healthy diet.

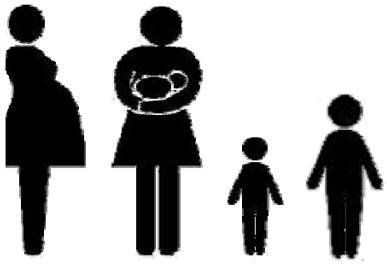
The dataset for fish from the San Joaquin Valley encompassed a very large geographic area including many separate and/or connected water bodies. Therefore, a series of approaches were undertaken to determine the best way to organize the data for the development of consumption guidelines. This process included assessment of mean mercury concentrations and other summary statistics in successive stages, beginning with individual sample sites and progressing to various groupings of the data by subregions. The sum of the approaches indicated a regional approach to be appropriate to characterize the results and to communicate them. Many of the species evaluated showed consistent mercury concentrations across the entire area. After considering the mercury data in detail, however, OEHHA found that for three key species, largemouth bass, channel catfish, and white catfish, mercury concentrations were lower in fish from water bodies in the South Delta than in the San Joaquin River south of the Port of Stockton. Therefore, to maximize opportunities for fish consumers in this area to enjoy consumption of local fish, regional differences were also presented and separate advice was included for each of two large regions: the San Joaquin Delta, including the San Joaquin River from its confluence with the Sacramento River to the Port of Stockton, and the San Joaquin River south of the Port of Stockton to Friant Dam. Review of limited data for chlorinated hydrocarbon contaminants from those locations on the San Joaquin River and/or in the South Delta that were sampled in the last ten years indicated

that consumption of fish with these contaminants would be protected by the advice based on mercury for all locations except the Port of Stockton area, as discussed below. Additional data would be useful to verify that organochlorine contamination is not widespread. One area where PCBs concentrations in fish were higher was noted in and around the Port of Stockton area. Some fish in this area, especially those from New Mormon Slough and Old Mormon Slough, were also contaminated with varying concentrations of dioxins and furans. Based on prior evaluations of these data, signs are currently posted that advise "no consumption" of fish and shellfish from the Port of Stockton area (Old Mormon Slough, New Mormon Slough, McLeod Lake, the Turning Basin, the Morelli Boat Ramp, and Lewis Park Boat Ramp). OEHHA has included these warnings with the draft safe eating guidelines in the tables that follow.

For general information on how to limit your exposure to chemical contaminants in sport fish (*e.g.*, eating smaller fish of legal size), see the California Sport Fish Consumption Advisories (http://www.oehha.ca.gov/fish.html) or Appendix II. Site-specific advice for other California water bodies can be found online at: http://www.oehha.ca.gov/fish/so_cal/index.html. Unlike the case for many chlorinated hydrocarbon contaminants, however, various cooking and cleaning techniques will not reduce the methylmercury content in fish.

DRAFT SAFE EATING GUIDELINES

FOR WOMEN OF CHILDBEARING AGE, PREGNANT OR BREASTFEEDING WOMEN, AND CHILDREN 17 YEARS AND YOUNGER



BASED ON MERCURY IN FISH FROM THE

SOUTH DELTA

INCLUDING THE SAN JOAQUIN RIVER
FROM THE SACRAMENTO RIVER TO THE PORT OF STOCKTON,
AND ALL RIVERS, SLOUGHS, AND FLOODED TRACTS IN THE DELTA
SOUTH OF THE SAN JOAQUIN RIVER

BEST CHOICES	
Eat up to 4 servings* a week (Total of 12 ounces cooked fish a week)	Bluegill or other sunfish, catfish, clams, or crayfish

OR

GOOD CHOICES	
Eat up to 2 servings* a week (Total of 6 ounces cooked fish a week)	Crappie; carp; sucker; largemouth, smallmouth, or spotted bass

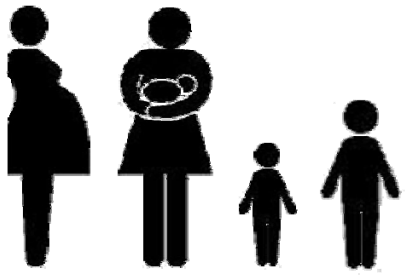
AVOID It is better for your health to eat fish from Best or Good Choices above	
No more than 2 servings* a month (Total of 6 ounces cooked fish a month)	Striped bass (18-27 inches) or sturgeon
Do Not Eat	Striped bass over 27 inches

Follow the "No Consumption" warnings where signs are posted for the Port of Stockton area

*** The recommended serving size for adults is three ounces of cooked fish (four ounces prior to cooking)**

DRAFT SAFE EATING GUIDELINES

FOR WOMEN OF CHILDBEARING AGE, PREGNANT OR BREASTFEEDING WOMEN, AND CHILDREN 17 YEARS AND YOUNGER



BASED ON MERCURY IN FISH FROM THE

SAN JOAQUIN RIVER

FROM THE PORT OF STOCKTON
TO FRIANT DAM

BEST CHOICES	
Eat up to 4 servings* a week (Total of 12 ounces cooked fish a week)	Bluegill and other sunfish, or crayfish

OR

GOOD CHOICES	
Eat up to 2 servings* a week (Total of 6 ounces cooked fish a week)	Catfish, crappie, carp, or sucker

AVOID	
Do Not Eat	Largemouth, smallmouth, or spotted bass

Follow the "No Consumption" warnings where signs are posted for the Port of Stockton area

*** The recommended serving size for adults is three ounces of cooked fish (four ounces prior to cooking)**

DRAFT SAFE EATING GUIDELINES
FOR WOMEN BEYOND CHILDBEARING AGE AND MEN

BASED ON MERCURY IN FISH FROM THE

SOUTH DELTA

INCLUDING THE SAN JOAQUIN RIVER
FROM THE SACRAMENTO RIVER TO THE PORT OF STOCKTON,
AND ALL RIVERS, SLOUGHS, AND FLOODED TRACTS IN THE DELTA
SOUTH OF THE SAN JOAQUIN RIVER

BEST CHOICES	
Daily (Total of 21 ounces cooked fish a week)	Bluegill or other sunfish
Eat up to 6 servings* a week (Total of 18 ounces cooked fish a week)	Clams, crayfish, crappie, or carp
Eat up to 4 servings* a week (Total of 12 ounces cooked fish a week)	Catfish; sucker; largemouth, smallmouth, or spotted bass

AVOID It is better for your health to eat fish from Best or Good Choices above	
No more than 4 servings* per month (Total of 12 ounces cooked fish a month)	Striped bass (18-35 inches) or sturgeon
Do Not Eat	Striped bass over 35 inches

Follow the "No Consumption" warnings where signs are posted for the Port of Stockton area

*** The recommended serving size for adults is three ounces of cooked fish (four ounces prior to cooking)**

DRAFT SAFE EATING GUIDELINES
FOR WOMEN BEYOND CHILDBEARING AGE AND MEN

BASED ON MERCURY IN FISH FROM THE

SAN JOAQUIN RIVER

FROM THE PORT OF STOCKTON
TO FRIANT DAM

BEST CHOICES	
Daily (Total of 21 ounces cooked fish a week)	Bluegill or other sunfish
Eat up to 6 servings* a week (Total of 18 ounces cooked fish a week)	Crayfish, crappie, or carp
Eat up to 4 servings* a week (Total of 12 ounces cooked fish a week)	Catfish or sucker

OR

GOOD CHOICES	
Eat up to 2 servings* a week (Total of 6 ounces cooked fish a week)	Largemouth, smallmouth, or spotted bass

Follow the "No Consumption" warnings where signs are posted for the Port of Stockton area

*** The recommended serving size for adults is three ounces of cooked fish (four ounces prior to cooking)**

ADDITIONAL GUIDELINES AND INFORMATION

Fish are nutritious and are recommended as part of a healthy, balanced diet. The American Heart Association advises healthy adults to eat at least two 3-ounce portions of cooked fish, preferable fatty fish, each week. It is important, however, to choose your fish wisely. OEHHA recommends that you choose fish to eat that are low in mercury and other contaminants. The recommended options are presented as "Good Choices" and "Best Choices." When fish contain high levels of mercury or other chemicals, OEHHA recommends that you avoid eating these fish.

- **MEAL SIZE DEPENDS ON BODY WEIGHT.** The safe eating guidelines are based on a recommended serving size of three ounces of cooked fish or shellfish (four ounces prior to cooking) — about the size of a deck of cards. If you weigh less than the average (about 160 pounds), it is best to eat smaller servings. Serve smaller servings to children – about half as much as adults for children 12 and under.
- **CONSIDER THE FISH YOU BUY FROM STORES AND RESTAURANTS.** Women of childbearing age and children can safely eat up to 12 ounces a week of a variety of fish purchased in stores or restaurants, or use this guide for eating fish caught from the San Joaquin River and South Delta. Commercial fish such as shrimp, king crab, scallops, farmed catfish, wild ocean salmon, oysters, tilapia, flounder, and sole generally contain some of the lowest levels of mercury. Women of childbearing age and children should not eat shark, swordfish, king mackerel, or tilefish, which contain the most mercury.
- If you also eat fish that you buy from stores and restaurants during a week that you eat local sport fish, choose the local sport fish that you eat from "Best Choices."
- **FISH FROM OTHER WATER BODIES MAY ALSO CONTAIN MERCURY**. Not all water bodies in California have been tested. With the exception of ocean or river-run salmon or steelhead, which may be consumed more frequently, you can eat up to two servings a week of fish caught from places currently without an advisory – one serving is three ounces of cooked fish (four ounces prior to cooking).